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TO AMEMBASSY LONDON

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E.O. 11652: N/A

TAGS: TSPA

SUBJ: NASA LASER RANGING STATIONS AT GRAND TURK AND BERMUDA

REF: A. LONDON 15859; B. LONDON 16186; C. STATE 250018;

D. LONDON 16850

1. APPRECIATE EMBASSY'S SUCCESSFUL EFFORTS IN PERSUADING
HMG OF APPLICABILITY OF PRESENT NASA AGREEMENT IN BERMUDA
FOR ESTABLISHMENT OF TEMPORARY LASER STATION.

2. REF PARA 3 REF A SIMILAR PRECAUTIONS WILL BE EXERCISED
AT GRAND TURK REGARDING SAFETY, I.E., CLOSE COORDINATION
WITH US DEFENSE AUTHORITIES AS WELL AS VISUAL TELESCOPIC
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OBSERVATIONS, RADAR SURVEILLANCE AND SHUT OFF SWITCHES

AS EXPLAINED REF C.

3. RE PARA 2 REF A THE LASER SYSTEM WHICH WILL BE USED AT BOTH SITES IS A MOBILE PULSED-LASER OPTICAL RANGING SYSTEM CAPABLE OF TRACKING SPACECRAFT EQUIPPED WITH CORNER REFLECTORS. SYSTEM CONSISTS OF NIKE-AJAX MOUNT MODIFIED FOR OPTICAL TRACKING PURPOSES AND CONTAINS TRANSMIT AND RECEIVE OPTICS, LASER TRANSMITTER SUBSYSTEM, RECEIVE SUBSYSTEM, TRACKING AND CONTROL SUBSYSTEM, DATA RANGING SUBSYSTEM, DIGITAL COMPUTER AND TIMING SUBSYSTEM. ALL EQUIPMENT IS MOUNTED IN SELF-CONTAINED ENVIRONMENT-CONTROLLED TRAILER.

4. OPERATION IS BASED ON ILLUMINATING WITH LASER BEAM ARRAY OF CORNER REFLECTORS ON SPACECRAFT, DETECTING REFLECTED LASER BEAM AND CONVERTING ELAPSED TIME BETWEEN TRANSMISSION AND DETECTION INTO EXACT SPACECRAFT RANGE (DISTANCE). ACQUISITION AND TRACKING OF SPACECRAFT IS DEPENDENT ON PREDICTED ORBITAL INFORMATION AS WELL AS VISUAL OBSERVATION AND CORRECTION.

5. LASER TRANSMITTER SUBSYSTEM PROVIDES RELIABLE, STABLE OPERATION AT PULSE RATE OF 1-PPS. SINGLE PULSE OUTPUT AT 6943A IS APPROXIMATELY 1/4 JOULE WITH PULSE WIDTH OF 5 NANoseconds. OPTICAL SYSTEM REDUCES DIVERGENCE OF LASER BEAM TO A MEASURED 0.5 MILLIRADIANS.

6. FIRING OF LASER MAY BE INITIATED AUTOMATICALLY OR MANUALLY. IN AUTOMATIC MODE ACTUAL TRIGGERING IS CONTROLLED BY 1-PPS ON-TIME CLOCK PULSE THAT ENABLES LASERS TO FIRE AT MAXIMUM RATE OF 1-PPS AND ALSO PROVIDES Q SWITCH SYNCHRONIZATION WITH RUBY. IN MANUAL MODE, EACH TIME FIRE PUSH BUTTON IS DEPRESSED, LASER IS FIRED BUT IS STILL SYNCHRONIZED WITH 1-PPS ON TIME CLOCK PULSE. WHEN LASER TRIGGERED, CAPACITOR BANK IS DISCHARGED THROUGH INTERNAL FLASH LAMP AND INTENSE RADIANT LIGHT IS ABSORBED BY RUBY ROD. CHROMIUM IONS WITHIN ROD RAISED TO STATE OF HIGHER ENERGY AND LASING ACTION TAKES PLACE UNDER CONTROL OF AN ELECTRO-OPTICAL Q SWITCH.

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7. RESULTING BEAM THEN IS PASSED THROUGH COLLIMATING OPTICS TO REDUCE OUTPUT DIVERGENCE. SMALL SAMPLE OF LASER OUTPUT IS DIRECTED THROUGH A BEAM SAMPLING DEVICE, FOR MONITORING POWER OUTPUT OF TRANSMITTER AND INITIATING TIME INTERVAL COUNTER FOR RANGING CALCULATIONS.

8. TO SATISFY FAA SAFETY REGULATIONS, RADAR COVERAGE

IS REQUIRED DURING SYSTEM OPERATIONS. A RADAR SYSTEM AN/MPQ-29 IS TRAILER-MOUNTED AND INCLUDED AS PART OF LASER SYSTEM. IT IS CAPABLE OF SEARCHING FOR AUTOMATICALLY TRACKING AND PLOTTING AIRBORNE TARGETS WITHIN RANGE OF 100,000 YARDS. RANGE SAFETY RADAR OPERATOR ALERTS THE LASER RANGING SYSTEM OF ANY AIRCRAFT IN AREA. RADAR OPERATES ON FREQUENCY OF 9100 MHZ AT PULSE REPETITION RATE OF 1000 PULSES PER SECOND WITH PULSE WIDTH OF EITHER 0.25 OR 0.50 MICROSECONDS. PEAK POWER OUTPUT IS 40 KILOWATTS.

9. ADDITIONAL DETAILS BEING AIRPOUCHED TO EMBASSY.

10. FYI: GEOS-C LAUNCH NOW SCHEDULED FOR NO EARLIER THAN 5 MARCH. END FYI. KISSINGER

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